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MINOR STUDIES FROM THE PSYCHOLOGICAL LABORATORY
OF CORNELL UNIVERSITY.

Communicated by E. B. TITCHENER.

I.

"MEDIATE" ASSOCIATION.

By H. C. HOWE, A. B.

Our object was the investigation of the "mediate" association, in Scripture's sense (*Ueber den associativen Verlauf der Vorstellungen* : *Phil. Studien*, VII. pp. 60 ff. Espec. pp. 81 ff.). The literature of the problem answers the question as to the occurrence of this form of association both negatively and affirmatively, in terms of experiment and criticism (Wundt: *Bemerkungen zur Associationslehre* : *Phil. Studien*, VII. pp. 329 ff. Espec. pp. 360, 361. Münsterberg: *Beiträge zur experimentellen Psychologie*, Heft IV. pp. 1 ff. Espec. p. 9. Titchener: *Mind*, N. S., I. pp. 226, 227; II. p. 235). Our experiments were carried out with six subjects: Messrs. Hinman (*H.*), Irons (*I.*), Knox (*K.*), Leighton (*L.*), Smyser (*S.*), and Watanabe (*W.*); in the months January to mid-March, and April to June, 1893. Two days' experimentation was devoted to practice in each case. The experiments were of two kinds.

(1) Auditory experiments.

The subject was seated in a dark room. To him were read regularly and distinctly (*a*) a series of six words, each word having a nonsense-syllable attached to it; (*b*) a second series, with the same nonsense-syllables; (*c*) the first series again, the reader waiting after each word for the subject to state his first association. All pauses were controlled and kept as constant as possible. The lists at first contained monosyllabic English words. For these were substituted, later, pairs, of which the one term consisted of English, the other of Latin, French or German words. In the course of 557 experiments there occurred eight apparent cases of "mediate" association, distributed as follows:

Observer.	Expts.	Cases.
<i>H.</i>	123	3
<i>I.</i>	36	0
<i>K.</i>	160	2
<i>L.</i>	26	0
<i>S.</i>	154	2
<i>W.</i>	58	1

These were, however, variously explicable. (a) In four cases the observer was able to state that he had directly associated, mentally, before association was called for by the experimenter. (b) Twice the word recalled was the first word in a series. (c) Once the word recalled was the most "striking" or unfamiliar word in a series. [It was also a first word; so that this case has been already counted, under (b).] (d) Once the observer remembered the whole second series of words, in their order. The first series was not called over in order as first given, but the place of the recalled word had by chance escaped change. (e) One case remains unexplained.

Remarks.—This was the first part of our work. The subjects, at the outset of their practice, were unduly impressed with the importance of the nonsense-syllable. They associated with the word called either the syllable, an extraneous idea, or nothing. The extraneous association was ruled out for experimentation, the subject being required to make his association within the series. He then did give words of the corresponding series: but, if the correct word, always by simple memory. Throughout, too large a share of the attention appeared to be directed upon the nonsense-syllable. Error thus arising is very difficult to eliminate. We guarded against it so far as possible, but put no great faith in this whole method. Again, in the case of all of our subjects, the visual memory was stronger than the auditory. If word and link were visually presented, a second view of the word recalled a visual image of the link in its former position; but during the presentation of an auditory series, each word seemed to blur the memory-image of preceding words.

(2) Visual experiments.

Scripture's apparatus was reproduced (*Phil. Studien*, VII. p. 36), and his procedure exactly followed, except that for the 4'' limit a 2'' limit was substituted (p. 54). Our practice-experiments suggested this as an improvement. We found a source of error in the shortness of Scripture's series: the subject is able to memorize. Moreover, if two word-series were employed, we discovered that the subject was apt to associate together words of the same series. These difficulties were overcome by the employment of a series of six pictures and a word-series of equal length. That the observer should have no trouble in naming his associations, we arranged the experiment in such a way that a picture series was always shown in the third place. As links we used variously colored rings of various sizes, and small variously colored figures (diamond, triangle, fleur-de-lis). The aim was, of course, to present an object which should be perceived, but not apperceived; which should neither be conspicuous nor very readily named. Finally, since the subjects tended still to associate links rather than words, they were urged to concentrate their attention more strongly upon the pictures and upon the words. More could not be said by way of direction, without their being informed of the precise nature of the problem. Of these experiments we performed 961. There occurred 72 apparent cases of "mediate" association, distributed as follows: (See table on opposite page.)

These were, again, variously explicable. (a) In 21 cases the observer was able to state that he had directly associated, mentally, before association was called for by the experimenter. (b) In nine cases, both word and link were given as association; but the word was given first. [Six of these come also under (h), one under (f), and one under (g).] (c) In twenty cases a picture called up the picture following it, independently of the word. [Seven, also, under (h), seven under (i), four under (i) and (g), one under (g) and (h).] (d) In five cases association took

place through an extraneous connecting idea. [One, also, under (f).] (e) Once the word recalled was the most "striking" word in a series. [Also under (f).] (f) Seven times it was the first word in a series. [Four cases also under (i), one under (b), one under (d), one under (e).] (g) Eight times it was the last word in a series. [Once also under (b), once under (i), four times under (i) and (c), once under (c) and (h).]

Observer.	Expts.	Cases.
<i>H.</i>	224	15
<i>I.</i>	71	1
<i>K.</i>	238	14
<i>L.</i>	33	3
<i>S.</i>	196	9
<i>W.</i>	199	30

(h) Sometimes the whole list was memorized, links and words; but, in naming the association, a link or a word would slip the observer's memory. Seventeen cases. [Seven also under (c), six under (b), one under (c) and (g).] (i) Or, in naming the association, both word and link were given, but the word first. Seventeen cases. [Eight also under (c), four under (f), one under (g), one under (b) and (f), three under (c) and (g).] (k) The word was mentally imaged before the picture was shown. [Seemed to cross other rules in two cases. These could not be arranged under (e).] (l) The word was remembered as being at a particular point of the series, though the remaining words were forgotten. One case. (m) Three cases remain unexplained. One of them occurred in a series, one word of which had been inadvertently omitted, so that only five were given.

Remarks.—The observer *W.* is possessed of an exceedingly accurate pictorial memory. His thirty apparent cases were those which threw most light on the various origins of the whole number.

Results.—We have, in 557 auditory experiments, found one unexplained case of apparent "mediate" association; in 961 visual experiments, two or three such cases. These instances may be referred either to chance, to deficient memory on the part of the observer, or to deficient analysis on the part of the experimenter. So far as our experiments take us, we may conclude, against Scripture, that "mediate" association does not occur. On the whole, the appearance of the phenomenon is a function of attention. We do not consider that the method employed is wholly satisfactory. Even in the visual experiments there are operative many conditions which lead to error in result and which are hardly eliminable. "Free" associations alone can, we think, form the basis of a certain experimental conclusion in any similar department of associative investigation.

[*Note to the foregoing.*—Mr. Howe's experiments have suggested to me a source of error in the determination of the time-value of the verbal associative reaction. This source of error consists in the fact that the "associated" word may be, and will often tend to be, a word which is not associated to, but already apperceptively combined with the stimulus. When Wundt "associated" *Wind* to *Sturm*, in 341*r* (*Phys. Psychol.*, II. 2d Ed. p. 315), he was obviously completing the apperceptive combination *Sturmwind* (cf. the *Kirchthurm* of p. 335). This error, it would seem, can only be circumstantially eliminated.—E. B. TITCHENER.]